DOCUMENT RESUME

ED 413 500 CE 075 157

AUTHOR	Boggs, Heather; Laurenson, Sandra
TITLE	Problem-Based Teaching: A Bridge to Meaningful Learning. Teacher Facilitator Guide. A Professional Development Videotape Series.
INSTITUTION	Ohio State Univ., Columbus. Vocational Instructional Materials Lab.
SPONS AGENCY	Ohio State Dept. of Education, Columbus. Div. of Vocational and Adult Education.
PUB DATE	1997-00-00
NOTE	70p.; Videotape not available from EDRS.
AVAILABLE FROM	Publications, Center on Education and Training for Employment, 1900 Kenny Road, Columbus, OH 43210-1090 (order no. FCS-PBT, guide and three videotapes: $150).
PUB TYPE	Guides - Classroom - Teacher (052)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Action Research; Classroom Techniques; *Inservice Teacher Education; Learning Activities; Lesson Plans; *Problem Solving; Secondary Education; Teaching Methods; Videotape Recordings; *Vocational Education
IDENTIFIERS	*Problem Based Learning

ABSTRACT

This facilitator guide is intended for use with a series of three videotapes designed to help teachers, staff developers, administrators, and teacher educators engage teachers in ongoing professional development supporting the implementation of a problem-based teaching approach in vocational education. The guide's introduction discusses the following: the videotapes' development, purpose, and content; use of action research to help teachers improve their practice; and use of the guide and videotapes to facilitate group study. The next section is an overview of the teacher activities included on the three tapes, which are devoted to the following topics: teaching process skills; teaching through practical problems; and teaching for practical action. Each section in the overview includes the following: synopsis of the videotape, set of preview questions; reflection and inquiry activities; and action research opportunities to guide teachers through the process of using new techniques and reflecting on their effectiveness. The second half of the guide consists of handout and overhead masters referenced to the videotapes. A list of 20 suggested print resources is included along with an annotated list of related products that would help teachers implement a problem-based approach. (MN)

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Problem-Based Teaching:

A Bridge to Meaningful Learning

TEACHER FACILITATOR GUIDE

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Published and distributed by:

The Ohio State University
Center on Education and Training for Employment
Vocational Instructional Materials Laboratory
1900 Kenny Road
Columbus, Ohio 43210-1090
(614) 292-4277

1997

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This publication was supported by
federal funds of Public Law 101-392,
the Carl D. Perkins Vocational Education and
Applied Technology Act Amendments of 1990,
distributed by the Ohio Department of Education,
Division of Vocational and Adult Education.

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ACKNOWLEDGEMENTS

Problem-Based Teaching: A Bridge to Meaningful Learning was developed under the direction of The Ohio Department of Education, Division of Vocational and Adult Education, Family and Consumer Sciences Section, with the cooperation of the Vocational Instructional Materials Laboratory at The Ohio State University. The videotape series is designed to be used by teachers, staff developers, administrators, and teacher educators to engage teachers in ongoing professional development that will support the implementation of a problem-based teaching approach.

The development of this videotape series would not have been possible without the cooperation of several Work and Family Life teachers and their students. These teachers graciously agreed to allow video production crews into their classrooms and to re-enact lessons they had previously taught. The students participated in the learning activities with enthusiasm in spite of dealing with video cameras capturing their every move. In addition, building administrators and other Family and Consumer Sciences teachers made special arrangements for the videotaping and helped the project activities run smoothly. Teachers videotaped for the project and the professionals who supported the videotaping were:

Sandra Royer, Trotwood Madison High School, Trotwood, Ohio
James E. Brown, Principal
Rebecca Daum, Work and Family Life Teacher
Tanza Reese, Work and Family Life Teacher

Ruth Ann Norris, Thomas Worthington High School, Worthington, Ohio
William Northrup, Principal
Monica Andryc, Work and Family Life Teacher
Susan Scott, GRADS Teacher
Diana Slater, Work and Family Life Teacher

Donna Jarzab, Springfield South High School, Springfield, Ohio
Richard Butler, Principal
Teresa Yontz, Department Chair and Technical Advisor
Susan Bogart, Work and Family Life Teacher
Candace Haffner, Work and Family Life Teacher
Pat Hocfbaum, GRADS Teacher
Pat Howard, Work and Family Life Teacher

The following Family and Consumer Sciences teachers shared their expertise about the problem-based teaching approach through comments that appear on the videotapes:

Kristi Andrews, Dublin Scioto High School, Dublin, Ohio
Terrie Bodey, Springfield North High School, Springfield, Ohio
Sarah Broadnax, East Technical High School, Cleveland, Ohio
Marlene Chilcote, Miami Trace High School, Washington Court House, Ohio
Sandra Holly, Colonel White High School, Dayton, Ohio
Marvella Lambright, Schaefer Middle School, Springfield, Ohio
Bonnie Short, Hilliard High School, Hilliard, Ohio
Diana Slater, Thomas Worthington High School, Worthington, Ohio

INTRODUCTION

About the Series

Problem-Based Teaching: A Bridge to Meaningful Learning was designed to assist teachers, staff developers, administrators, and teacher educators in engaging teachers in ongoing professional development that will support the implementation of a problem-based teaching approach.

The series consists of three 25-minute videotapes and the *Teacher Facilitator Guide*. The videotapes explain the problem-based teaching approach, show actual classroom examples, and include interviews with students and teachers about their classroom experiences with problem-based teaching.

Each of the three videotapes focuses on one of three essential components of problem-based teaching: teaching process skills, teaching through practical problems, and teaching for practical action. This *Teacher Facilitator Guide* provides background information, suggests a variety of reflection and inquiry ideas for teachers as they begin to use a problem-based approach, and identifies references and further readings to foster their understanding of problem-based teaching.

The series can be used to facilitate individual or small group study of problem-based teaching, including workshops or classes. Whenever possible, the activities and experiences should be conducted with groups of teachers working together.

The intent of this series is not to view the videotapes in one or two meetings, but rather to use the videotapes and the *Teacher Facilitator Guide* as tools for ongoing study of the problem-based teaching approach. Hence, the learning activities include preview questions, reflection and inquiry activities, and action research opportunities, as well as further readings and resources.

As with many other reform initiatives, problem-based teaching requires significant change from traditional classroom teaching practices and requires the support of meaningful professional development. This series is based on the concept of professional development as a continuum of experiences designed to promote personal and professional growth and lead to improvement in teaching practice. From this perspective, professional development is:

- a continuous process
- enhanced by interaction with colleagues
- based on both reflection and inquiry

Professional development that supports classroom change requires reflecting on new concepts and strategies and their relationship to present practices and beliefs about teaching, as well as trying out new techniques in the classroom.

Using the series with groups of teachers enhances professional development and provides a richer learning experience. Just as students benefit from the shared inquiry and reflection inherent in a problem-based approach, teachers also benefit from shared inquiry and reflection. A series of meetings can provide teachers the time needed to reflect on the videotapes and the learning experiences, to plan and try out problem-based teaching techniques, and to share their classroom experiences with other teachers, stimulating further inquiry and reflection. These kinds of professional development experiences are most likely to support successful implementation of a problem-based approach. To support this process, the *Teacher Facilitator Guide* includes action research opportunities to stimulate ongoing professional development.

Using Action Research

Action research is a process teachers can use to improve their teaching practice. It engages teachers in reflecting about teaching and learning and designing ways to resolve problems or address questions they have about their practice. Essentially, action research is problem-based learning for teachers. When used by groups of teachers, action research can foster collaboration and a shared commitment to improvement. This *Teacher Facilitator Guide* suggests several opportunities for action research, which can be implemented using four basic steps:

Planning. Teachers identify a specific issue or idea about their practice and define a researchable problem. Since problem-based teaching can involve significant change, the suggested action research opportunities focus teachers toward specific issues or techniques within problem-based teaching.

Acting. Teachers collect information and develop a plan of action to implement an idea or resolve an issue.

Observing. Teachers collect data to determine the effects of their actions. The data might include their own notes of the effectiveness of actions taken; student reactions, work, or assessment scores; or videotaped or audiotaped lessons or the comments of observers.

Reflecting. Teachers review actions taken and observations about the effectiveness of those actions. This reflection frequently leads to further planning as the action research process begins again at a new level of awareness.

How to Use the Series to Facilitate Group Study

As you prepare to facilitate a group of teachers who will be learning about the problem-based approach, view all three videotapes in their entirety and read completely through the *Teacher Facilitator Guide*. The first videotape, *Teaching Process Skills*, begins with an introduction to the problem-based approach. That introduction is repeated in a shorter version on the two remaining tapes, *Teaching Through Practical Problems* and *Teaching for Practical Action*. After viewing all three tapes, select a tape you will use to begin the study of problem-based teaching. Though the tapes are numbered in a logical sequence, you may wish to begin with the second or third tape based on the needs of teachers.

The following recommendations are offered as guides for designing sessions for teachers to view and discuss the tapes as well as plan action research projects.

Prepare a short list of preview questions for the session (suggestions are included) and provide them to teachers prior to the session. This will give them time to reflect thoughtfully on the questions. You may even ask them to write down some of their responses. A starting point for the sessions might be sharing these reflections in small groups and analyzing common themes. In addition to the preview questions, you may select some reading materials from the **Suggested Resources** (p.64) or the **Background Information on Problem-Based Teaching** (p.4-6) and ask teachers to read them prior to the session.

Show all or part of one videotape. Although there are no prompts on the videotapes to stop for discussion, you may notice several points at which you would like to do so. The reflection activities you select from the *Teacher Facilitator Guide* may be interspersed at selected points throughout the tape or conducted after viewing the entire tape.

Conduct several of the reflection and inquiry activities from the *Teacher Facilitator Guide,* using any accompanying handouts. Some handouts in the *Teacher Facilitator Guide* are designed to be used as overhead transparencies with larger groups. Permission is granted for handouts to be copied for teachers participating in professional development activities related to this video tape series.

Engage teachers in developing action research projects as suggested in the *Teacher Facilitator Guide*. Once teachers have initiated projects, further sessions should provide time to share observations and reflect on actions taken, leading to new projects and a continuing cycle of researching their practice.

Identify further readings listed in **Suggested Resources** (p.64) that would be helpful to teachers and provide time for reading and discussion of these resources.

Repeat the above steps for each videotape or portion of a videotape. Evaluate the teachers' progress toward implementation by monitoring action research projects, asking for teacher feedback about the effectiveness of the sessions, and listening to teachers during small group discussion.

Background Information on Problem-Based Teaching

As educators, we are challenged to prepare our students for their roles in a complex, ever-changing world. Students must be critical and creative thinkers rather than memorizers of information to live and work successfully in our diverse, global society. They must be able to solve problems, direct their own lifelong learning, and work collaboratively with others to provide leadership in families, communities, and workplaces.

To prepare students to meet these challenges now and in the future, educators need a curricular approach that fosters the ability of all students to act responsibly for the benefit of self and others and make reasoned judgments in caring ways.

Problem-based teaching is an approach teachers can use in the classroom to help students become actively involved in meaningful learning. This instructional model, also referred to as problem-based learning, was first developed in medical education in the mid-1950s as a replacement for the traditional lecture approach. As it was refined, the problem-based approach was further adopted in business schools, schools of education, architecture, law, engineering, and social work.

High school, middle school, and elementary educators became interested in the approach as a way to enhance learning and deepen each student's understanding about subject matter, as well as to foster lifelong learning skills. In the problem-based approach, teachers build units of study around problems relevant to students, engage students in seeking information and reasoning through the problem, and help students apply information to solve the problem.

The problem-based teaching approach is based on several important principles of learning:

Cognitive conflict or puzzlement stimulates learning and helps determine how the brain will organize what is learned. In a learning environment that promotes meaningful learning, the learner sees a purpose for being there. Problematic situations provide an organizer for learning and engage the learner through the puzzlement that occurs when the current experience or situation does not match existing knowledge. When students are faced with a problem or task they see as relevant, they recognize and appreciate a greater purpose for learning: to function more effectively in their world and to assume responsibility for and control of their futures.

All learners construct their own knowledge. Deep, perceptual knowledge is what results when the brain has incorporated knowledge into a system that will influence beliefs and actions. In order for students to achieve and apply such knowledge, they must be actively involved in making meaning of information, rather than merely passively receiving it. This type of learning, also referred to as authentic learning, mirrors the way in which students learn in the real world. To develop such knowledge, students must relate what they are learning to prior knowledge and experiences, be actively engaged in seeking information, and reflect on ideas and information as they construct their own knowledge. This type of knowledge is required to effectively resolve complex problems and take action in real-life settings.

Meaningful learning requires a rich learning environment including substantive interaction with other learners. Through social interaction with other learners, students deepen their individual understanding. Collaborative groups are important to testing understanding,

perceiving alternative views, and expanding knowledge. Since the brain is complex and operates on many different levels, a rich sensory environment is also important. Students should have a variety of resources and experiences to support their thinking and inquiry. This complex environment should closely represent resources and experiences students might encounter in the real world, modeling a culture for lifelong learning and problem solving. In problem-based teaching, students actively engage in solving authentic problems. They take responsibility for their own learning by researching information for problem-solving. Teachers act as facilitators in the learning process by helping students access and evaluate resources, collect and analyze information, and use thinking processes to create alternatives and arrive at conclusions.

The problem-based teaching approach includes three essential components, each featured on one videotape:

- **Teaching Process Skills,**
- **Teaching Through Practical Problems,**
- **Teaching for Practical Action.**

Teaching Process Skills

In order to resolve practical problems, students need two different kinds of knowledge: content knowledge such as concepts, principles, and other declarative knowledge, and process knowledge such as how to solve problems, communicate and cooperate with others, and manage resources.

In the problem-based approach described in this series, emphasis is placed on four essential process skills:

- practical problem solving
- relating to others
- leadership
- management

These skills prepare students to build strong families and to function effectively in communities. In addition, these four skills are among those identified by the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) as essential to success in the workplace. Each skill involves the development of critical and creative thinking abilities as well as interpersonal competence, so that students can take thoughtful, effective action in the face of changing knowledge and complex, practical problems.

In the problem-based approach, intellectual and interpersonal process skills are directly taught and then used throughout classroom learning experiences. Students need a basic understanding of these process skills in order to effectively solve the practical problems they will face as part of problem-based instruction. Early learning activities help students understand the rationale for learning process skills, develop the concept of the skills, and establish a vocabulary that students and teachers can use to practice and reflect on skill development. The process skills are also integrated into the course content of the curriculum through authentic learning tasks that help students practice and reflect on their development.

Teaching Through Practical Problems

In problem-based teaching, the content of the curriculum is organized around practical problems. Practical problems are complex ethical questions about what is best to do. Traditionally, teachers usually focused on directly teaching content before students were asked to apply that knowledge to a project or problem. But in the problem-based approach, units or lessons *begin* with a practical problem sometimes posed by the teacher and sometimes by students. The most meaningful learning often comes from practical problems which emerge during discussions.

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Students analyze the problem and discuss what they will need to learn in order to solve it. Then, students are engaged in seeking information and reasoning through the problem, creating and evaluating alternative choices and their consequences and developing criteria and standards for making ethical choices. Next, students select a choice and take action. Finally, students reflect on the action taken and the impact of their experience on their roles in interpersonal, family, school, community, and work settings.

Teaching for Practical Action

In problem-based teaching, learning activities are designed to help students take practical action in technical, communicative, and emancipatory ways. "How to," technical action involves factual information and procedural knowledge. Communicative action is needed to communicate with others, discussing opposing points of view and clarifying values, and to understand shared meanings, beliefs, values, norms and attitudes. However, these two types of action — technical and communicative — are often insufficient to enable students to take action for the well-being of self and others.

For example, students might use technical "what and how-to" knowledge of the food pyramid to take technical action to plan healthful meals for their families. They might take communicative action sharing information about food likes and dislikes, activity schedule, and allergies with family members or friends resulting in a greater mutual understanding of each other– understanding which might ease tensions but do little to improve individual food choices or well being.

A third type of action, emancipatory action, is necessary in order to be proactive in bringing about change to improve conditions in families, communities, and workplaces. Emancipatory action to improve the well-being of family members as well as the students themselves might evolve out of the messy practical problem, What should we do to positively influence the food choices of our family members? Or our classmates? Or members of our community? Or What should we do to improve the nutritional well-being of third world nations? Learning how to take emancipatory action means learning to evaluate family and societal conditions to make reasoned, ethically sound judgments.

Focusing on these three different kinds of action, particularly emancipatory action, encourages students to stop and think rather than act impulsively for instant gratification. With an emancipatory perspective, students choose to act in ways that are best for self and others.

To help students take all three kinds of action, teachers model and help students learn to use classroom questions that focus on technical, communicative, and emancipatory actions. Questions such as, "What choices can we create in this situation that will be in the best interests of self and others?" and "What would happen if everyone took this particular action?" help students evaluate their potential actions and their consequences on others. Learning activities are included to examine technical information, communicate with others to identify varying perspectives, and design actions, often in the form of service learning, that will educate others or bring about needed change.

In summary, the problem-based approach helps students become better problem solvers, developing their skills in reasoning, collaboration, and persistence in directing themselves as they search for solutions. Many teachers who use the problem-based approach notice their students become enthusiastic about solving problems and directing their own learning. Since this approach helps students make important connections between school subjects and the world outside of school, it provides important preparation for the real-life problems students will face in families, communities, and workplaces.

Overview

The teacher activities included in this section were designed to build throughout the videotape series by engaging teachers in a process of reflection and inquiry about problem-based teaching. First, several activities are included that can be used prior to viewing the videotape series. These preview activities ask teachers to reflect on what they already know about the approach, as well as invite them to pre-read some resources on problem-based teaching. Next, a section is included for each of the three videotapes: *Teaching Process Skills, Teaching Through Practical Problems,* and *Teaching for Practical Action.* The section for each videotape includes:

- a **synopsis of the content** of the video tape. You may want to review the sequence of content on the tape to determine appropriate stopping points for discussion.
- a set of **preview questions** to engage teachers in reflection about the component illustrated on the videotape.
- **reflection and inquiry activities** to help teachers draw conclusions about what they have seen on the videotapes and how it might influence their own classroom practice.
- **action research** opportunities to guide inquiry as teachers try out new techniques and reflect on their effectiveness.

If you are facilitating group study, you will need to select those activities appropriate to the needs of your teachers and the time you have together. Be sure to photocopy any handouts necessary for the activities you select. Some handouts may also be used as overheads. Though the activities lend themselves best to group study, any or all of the activities can be used for individual study as well. Plan for variety in group organization for discussion and reporting through the use of flip charts, posters, transparencies, graphic organizers, or skits.

Note: All activities and questions that follow are written as if directed to the teacher.

Before Viewing the Videotape Series...

Reflect on the questions below...

- What have you heard about problem-based teaching?
- Have you tried any problem-based teaching strategies in the classroom?
- From what you have heard or experienced with regard to problem-based teaching, what interests you most about the approach?
- What questions do you have about problem-based teaching?
- What would you like to learn about problem-based teaching?

As an introduction to problem-based teaching, read the **Background Information on Problem-Based Teaching** (p.4) or select one of the **Suggested Resources** (p.64). After completing the readings, draw a graphic representation of your understanding of problem-based teaching. Use the questions below to reflect on the readings.

- What are the philosophical foundations underlying the problem-based approach?
- How do these philosophical foundations match your own beliefs about good teaching and learning?
- Why is problem-based teaching gaining acceptance and promotion as an educational approach?

Create a chart with three columns: Plus, Minus, and Interesting. Using what you know about problem-based teaching so far, list the positive aspects of this approach in the Plus column, the negative aspects of this approach in the Minus column, and things that interest you about this approach in the Interesting column.

Plus	Minus	Interesting

Synopsis

This videotape provides an introduction to problem-based teaching and then focuses on the first essential component, *Teaching Process Skills.* The videotape:

- explains the three essential components of problem-based teaching: teaching process skills, teaching through practical problems, and teaching for practical action
- identifies and describes four process skills important to the problem-based approach: problem solving, management, leadership,and relating to others
- explains these skills are directly taught in a series of lessons and then reinforced throughout the course in authentic learning tasks
- provides a classroom example of the direct teaching of one of the process skills, problem solving. The teacher engages her students in developing a rationale for learning how to solve problems, identifies the steps of practical problem solving using a model called REASON, and helps students practice the process.
- provides student and teacher comments about the process skills lessons
- summarizes what the teacher has done in the classroom example
- concludes with teacher and student comments about teaching process skills as part of the problem-based approach

Preview Questions

- What do students need to know and be able to do to be successful in families, workplaces, and communities?
- What "big skills" should we teach students to help them become lifelong learners?
- How do students learn these "big skills?"
- What experiences have you had teaching these "big skills" to your students?
- What makes teaching these "big skills" so challenging?

Reflection and Inquiry Activites

As you view *Videotape 1: Teaching Process Skills*, consider the following questions:

1. What do students and teachers see as the benefits of the problem-based approach?
   What do students gain?
   What do teachers gain?

2. What are the four process skills identified on this tape?
   Why are they important?

3. What sequence of activities does the teacher use to introduce students to problem solving?
   Why has she selected these activities?

Facilitator Note: If you are working with a group, divide the group into three teams before viewing the tape. Ask each team to listen specifically for and identify content addressed in one of the questions above and report back to the group as a whole after watching the tape. (**As you view *Videotape 1: Teaching Process Skills***, p. 28.)

• Read **Essential Components of Problem-Based Teaching** (p. 29) to review the components discussed in the videotape.
• Discuss the reasons for using a problem-based approach and why each component is important to the success of the approach.

• Read **What Are Process Skills?** (p. 30) to identify the process skills described in this videotape series. Though these are the four process skills identified in this videotape series, there are other process skills and different ways of conceptualizing them. • List other process skills you can think of that are not included on the handout. • Read from the list of **Suggested Resources** (p.64) about different ways to conceptualize process skills. • Discuss why these types of skills are important to success in families, workplaces, and communities. • Identify characteristics of these skills, such as those listed below.
• Discuss why these characteristics make these skills challenging to teach and distinguish them from declarative knowledge such as concepts, facts, and technical information.

1. *Process skills are complex.*
2. *Process skills develop over time.*
3. *Students have prior experience with process skills.*

• Read **Introducing Process Skills to Students** (p. 31). • Discuss why introductory lessons on process skills are important to the problem-based teaching approach. • Share ways in which you have introduced these skills to your students. • Examine **Problem-Solving Lessons** (p. 32) and discuss why the teacher included the various learning activities. • If you have taught problem solving to your students, describe the similarities and differences between the lessons shown on the videotape and your lessons.
• Respond to the following questions (Overhead Master (OM): **Considering Problem Solving**... p. 33) with regard to what you have seen on the videotape. Then think about the same questions in terms of lessons you have previously taught on problem solving.

- What rationale have students developed for learning how to solve problems?
- What have students learned about problem solving from this lesson?
- What common vocabulary have students developed around the process skill of problem solving?
- What problem solving questions have students began to use?

• Read **Action Research Bookmark** (p. 34) and Action Research Planning Form (pp. 35-36). Discuss how Action Research can improve your teaching. Identify the pros and cons of collaborating on action research.

Action Research Opportunity: (p. 37) Research the practical problem, What should I do to introduce my students to practical problem solving?

Using the **Action Research Planning Form** (pp. 35-36), plan a series of lessons to introduce practical problem solving in your classroom. *The Work and Family Life Resource Guides* listed in the reference section of this guide can provide sample activities for these lessons. Try your plans out in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

• Read **Different Problems, Different Approaches** (p. 38). • Discuss reasons why it is important to help students distinguish practical problems from other types of problems they might face. • Make a list of practical problems your students face on a regular basis. Which of these practical problems might you use to frame units of study in the courses you teach? • Reflect on the following questions (OM: **Thinking about Different Problems, Different Approaches** p. 39).

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- What makes practical problems different from scientific or technical problems?
- Why is it important for students to learn how to solve practical problems?
- What specific questions are important for students to consider as they solve practical problems?

• Read **REASON Model for Problem Solving** (p. 40). • Identify similarities and differences between this model and other problem-solving models you may have taught to your students. • Discuss why the REASON model would help students learn to solve practical problems. • Discuss what students and teachers on the videotape say about learning this process.

Action Research Opportunity: (p. 37) Using the **Action Research Planning Form** (pp. 35-36), research the question, What should I do to help students think through practical problems? Review the **Practical Problem-Solving Think Sheet** (pp. 41-42) that the teacher on the videotape uses to introduce students to the steps of the practical problem-solving process. Design a think sheet for your students to use when they are reasoning through practical problems in your classroom. Use the think sheet with your students and ask for their feedback. Reflect on the think sheet and modify it for future use based on your findings.

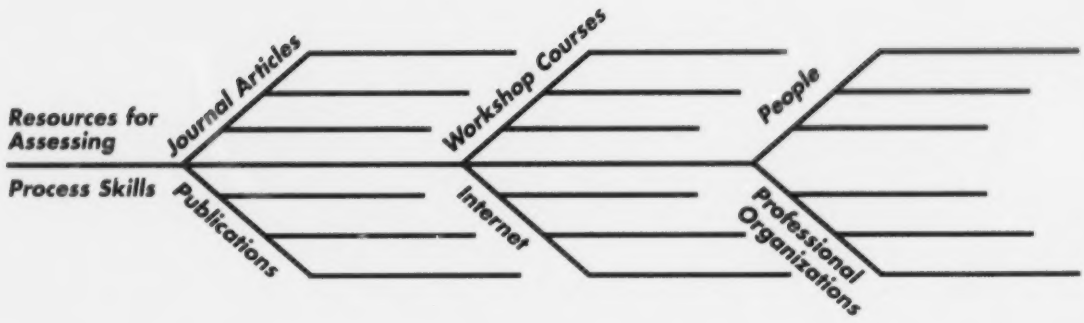
• In this videotape, you see an example of a lesson plan to introduce the skill of problem solving. What might lessons look like to introduce other process skills, such as relating to others, management, and leadership? • Discuss ways in which you have helped students develop these skills in your classroom.

• Describe lessons you might develop that would help students:

1. *Develop a rationale for learning these process skills*
2. *Understand the concepts of the process skills*
3. *Establish a vocabulary for reflecting on process skill development throughout the course*

Action Research Opportunity: (p. 37) Using the **Action Research Planning Form** (pp. 35-36), research the question, What should I do about introducing my students to important process skills? Plan lessons to introduce other process skills, such as management, leadership, and relating to others. *The Work and Family Life Resource Guides* listed in the reference section of this guide can provide sample activities for these lessons. Try your plans out in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

• Since process skills are so important to success in communities and the workplace, think about ways you could help students document their development of these skills. • Use the resources included in this guide to identify assessment tools for process skills. Both *The Adolescent Parent Resource Guide* and *Alternative Assessment: A Family and Consumer Sciences Teacher's Tool Kit* provide several examples. • Create a fishbone graphic organizer, such as the one illustrated on the following page, (and OM: **Fishbone Graphic Organizer** p. 43) to identify sources of information you could use to access other ideas for assessing process skills. • Consider how career passports and portfolios can be used to reflect the development of process skills.



Action Research Opportunity: (p. 37) Using the **Action Research Planning Form** (pp. 35-36), research the question, What should I do to document the development of students' process skills? Develop an assessment tool for this purpose, such as a rubric or checklist. Create a portfolio assessment plan to help students collect work and show their development of process skills over time, such as a problem solving portfolio or a communication skills portfolio or a leadership portfolio. Try the assessment and portfolio plan out in your classroom and reflect on the effectiveness of your actions.

Teaching Process Skills - Exit Reflections

- **What are the most significant things you have learned about teaching process skills?**
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching process skills?
- What more would you like to learn about teaching process skills?

Facilitator Note: To encourage reflection on what teachers are learning from these activities, ask them to complete exit reflection cards at the end of each meeting. Distribute **Teaching Process Skills - Exit Reflections** cards (p. 44) or index cards and ask each teacher to respond to questions such as those above. Collect the cards as teachers leave the meeting and analyze the responses to evaluate the effect of reflection activities and to plan further meetings.

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Synopsis

This videotape focuses on the second essential component of problem-based teaching, teaching through practical problems. Following a brief introduction similar to the beginning of *Videotape 1: Teaching Process Skills,* this videotape:

- describes the process for teaching through practical problems: posing and analyzing a problem, researching information and reasoning through the problem, deciding on and taking a course of action, and reflecting on the actions taken.
- provides a classroom example in which the students are addressing the problem, "What should I eat to improve the performance of my high school athletic team?" The teacher introduces students to the problem, asks them what they already know about the problem and what they need to learn to resolve it, divides the class into research groups who make presentations on their findings, questions students about the ethical implications of their decisions, leads students in planning some actions they could take, and provides opportunities for reflection on the actions taken.
- provides teacher and student reactions to addressing practical problems in the classroom
- summarizes what the teacher does in the example as she teaches through a practical problem
- concludes with teacher and student comments about teaching through practical problems in the problem-based approach

Preview Questions

- What practical problems are relevant and important to your students?
- How do your students go about solving problems? What are their problem-solving strengths? In what areas could they improve?
- What kinds of problem-solving experiences would most likely interest your students?
- How might engaging students in solving problems lead to more meaningful learning? Increased student motivation? Transfer of learning to real-life situations?
- What experience have you had in involving your students in solving practical problems?

Reflection and Inquiry Activitiess

As you view *Videotape 2: Teaching through Practical Problems,* consider the following questions:

1. What sequence of activities are followed in the sample lesson?
2. What does the teacher do to facilitate the students' problem solving?
3. What types of questions does the teacher ask students?

Facilitator Note: If you are working with a group of teachers, divide the group into three listening teams. Ask each team to listen specifically for content addressed in one of the following questions and report back to the group as a whole after watching the tape. (**As you view *Videotape 2: Teaching Process Skills,*** p. 45.)

• Read **Identifying Problems for Instruction** (p. 46). (Overhead master (OM): **Practical Problems,** p. 47)
• Consider the topics you teach and identify those that you have framed or could frame as a practical problem. • Share your ideas with colleagues and add new ideas to your list.

• Describe how the teacher on the videotape introduces the students to the problem, What should I eat to improve the performance of my high school athletic team? • Other than a case study, what strategies could be used to introduce students to a practical problem they are about to study? • Consider the ideas for introducing problems listed below:

Statistics

Guest speakers

Connections to personal experience or the experience of peers

Interviews with those who are close to the problem

Videotapes, articles, or publications about the problem

• What are some interesting ways you have used to engage students in a problem or an area of study? • Why is it essential for students to see the problem as relevant and important to solve? • Select a practical problem appropriate for a course that you teach and create an interesting way to engage students in solving that problem. Share your idea with colleagues. • Read **Problem-Based Teaching Model** (p. 48) and **Problem-Based Lessons** (pp. 49-50).
• Describe what teachers and students interviewed on the videotape see as advantages and disadvantages to this approach.
• Discuss the rationale for sequencing learning activities so that the problem is presented at the beginning of a series of lessons. • A more traditional approach might follow the sequence of learning activities listed below. Identify the similarities and differences between the problem-based lesson on the videotape and a more traditional approach. (OM: **Sample Sequences of Learning Activities,** p. 51)

Traditional Sequence of Learning Activities for Sports Nutrition

1. *The teacher introduces the unit topic of sports nutrition.*

2. *A variety of strategies are used to present information to students about the topic, such as direct instruction, videotapes, and guest speakers.*

3. *Students are given a case study and asked to recommend a sample pre-game meal for the athlete in the case study.*

4. *The teacher assigns each group of students a pre-game meal to prepare in the foods laboratory. The students sample and evaluate the foods prepared.*

5. *The students take a paper and pencil test over what they have learned in the sports nutrition unit.*

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Action Research Opportunity (p. 52): Using the **Action Research Planning Form** (pp. 35-36), research the issue, What should I do to implement teaching through a practical problem? Plan a series of lessons using the **Problem-Based Teaching Model** (p. 48). Try out your plans in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

Action Research Opportunity (p. 52): Use the **Action Research Planning Form** (pp. 35-36) to research the issue, What questions can I ask students to facilitate problem solving? Select a problem-based unit you will be teaching and create a list of questions for that unit. Tape record or videotape the unit and analyze how students respond to the questions you ask.

• Make a list of the questions the teacher uses in the videotape to guide students' problem solving during the lessons. • Identify ways in which the questions accomplish the following objectives: (OM: **How Did Questions** p. 53)

1. Make connections between new information and prior knowledge
2. Organize and facilitate the learning environment to promote problem solving
3. Reason through a practical problem
4. Decide whether or not a solution is ethical
5. Take action that will help self and others

• Select a practical problem you could address with your students and develop a specific list of questions you could use to help students reason through that problem. Share your questions with your colleagues. • One of the challenges of using problem-based teaching is organizing a variety of resources students can use to seek information for problem solving. Discuss what resources the teacher provides for her students in the videotaped lesson. Like many teachers, this instructor does not have a lot of classroom resources. She collects a stack of books from the local library and brings them to class for student research. She does not, however, take on the responsibility of evaluating these resources for reliability, but rather expects students to substantiate the resources they choose. What are the advantages of this approach to supplying resources? The disadvantages? • Make a list of other ways to provide information that students can use when solving problems, such as those listed below.

1. Visiting a school or local library
2. Inviting speakers or asking students to interview resource specialists
3. Using media sources, such as videotapes, television programs, or video disks
4. Directly instructing students through mini-lectures or classroom discussion
5. Using textbooks and other print materials available in the classroom
6. Engaging students in identifying resources.

• Problem-based teaching presents rich opportunities for assessing students in a variety of ways. Read **Presentation Assessment Rubric** (p. 54) which the teacher uses to assess students' presentation of their sports nutrition topic. From what you observed on the videotape, what other types of assessment strategies could be used with this problem-based unit?

Action Research Opportunity (p 52): Research the issue, How should I assess my students during a problem-based teaching unit? Select a problem-based teaching unit you have developed and create a plan for assessing your students during that unit. Try to include a variety of assessments, including alternative assessments such as rubrics to document process skills or authentic performance. Use your assessment tools and collect data about their effectiveness. After reflecting on the effectiveness of your tools, make recommendations for future assessment practices.

Action Research Opportunity (p 52): Developing problems for students to solve lends itself well to integrating different subject matter areas. Through problem-based teaching, students can see how different subject matter areas connect. Research the issue, What should we do to integrate instruction in a way that is meaningful for students? Working with several teachers from different subject matter areas, plan and teach a thematic unit based around a practical problem. Begin by selecting a unit in which students must learn substantive content from a variety of subject matter areas. Decide how you will introduce students to the problem and how you will frame the problem-solving task. Teach the unit, collect data about it's effectiveness, and reflect on your actions by making recommendations for teaching integrated units in the future.

Teaching Through Practical Problems - Exit Reflections

- What are the most significant things you have learned about teaching through practical problems?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching through practical problems?
- What more would you like to learn about teaching through practical problems?

Facilitator Note: To encourage reflection on what teachers are learning from these activities, ask them to complete exit reflection cards at the end of each meeting. Distribute **Teaching Through Practical Problems - Exit Reflections** (p. 55) or index cards and ask each teacher to respond to questions such as those above. Collect the cards as teachers leave the meeting and analyze the responses to evaluate the effect of reflection activities and to plan further meetings.

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Synopsis

This videotape focuses on the third essential component of the problem-based approach, teaching for practical action. Following a brief introduction similar to the beginning of *Videotape 1: Teaching Process Skills,* this videotape:

- describes three types of action: technical, communicative, and emancipatory. All three types of action are needed if students are to be successful in families, workplaces, and communities.

- explains that teachers can prepare students to take these types of action by asking questions and providing learning experiences that foster each type

- provides a classroom example designed around the practical problem, What should we do about resolving conflict? First, the students examine technical information—ways to resolve conflict and the consequences of using each method. Next, students practice communicative action by listening to conflicts others have experienced. Finally, students plan service learning activities to help others resolve conflict in more positive ways.

- provides teacher and student reactions to taking technical, communicative, and emancipatory action in the classroom

- summarizes what the teacher does in the example as she leads students in taking technical, communicative, and emancipatory actions

- concludes with teacher and student comments about teaching for practical action

Preview Questions

- Why is it important for students today to be able to take action that is in the best interests of themselves, their families, and their communities?
- What kinds of action do students need to be able to take?
- What skills do students need in order to take these kinds of action?
- What has been your experience with helping students take action on classroom-related issues that are important to them?

Reflection and Inquiry Activities

As you view *Videotape 3: Teaching for Practical Action,* consider the following questions:

1. What learning activities are used to encourage different kinds of action?
2. What kinds of questions does the teacher ask during the lessons?
3. How are process skills reinforced through this unit on conflict resolution?

Facilitator Note: If you are working with a group of teachers, divide the group into three listening teams. Ask each team to listen specifically for content addressed in one of the following questions and to report back to the group as a whole after watching the tape. (**As you view *Videotape 3: Teaching Process Skills,*** p. 56.)

• Read **Three Systems of Action** (p. 57). • Explain how the lesson on the videotape supports students' ability to take all three kinds of action. • Read additional references from the **Suggested Resources** (p.64) about helping students take different kinds of action.

• Reflect on the questions below.

1. *Why have we as educators traditionally focused on helping students take technical action?*
2. *What do students learn from a focus on technical action?*
3. *In what ways have we as educators helped students take communicative action?*
4. *Why is a focus on technical and/or communicative action insufficient for preparing students for their role in families, communities, and workplaces?*
5. *What distinguishes emancipatory action from technical and communicative action?*
6. *Why is the ability to take emancipatory action an important goal for students?*

• Write down questions you heard the teacher ask during the lesson on the videotape. • Using this list, identify those questions you routinely ask your students in class. • Using **Questions for Practical Action** (p. 58), select key questions from each category that you would like to use in your classroom to help students take different kinds of action. Write them on index cards or a sheet of card stock to refer to as you teach. • Discuss why it is important to use these different types of questions.

Action Research Opportunity (p 59): Using the **Action Research Planning Form** (pp. 35-36), research the issue, How should I question students to encourage practical action? Using a list of key questions you developed in the previous activity, begin asking these questions of your students on a regular basis. Videotape or audiotape a classroom discussion in which you use these questions. Reflect on which questions are easiest to use and which questions are most difficult to use, as well as the impact the questions seem to have on students. Analyze your students' response to the questions and make recommendations about your questioning practices in the future.

• Read **Conflict Resolution Lessons** (pp. 60-61). Describe how the sequence and type of learning activities selected for the lesson contributed to the students' ability to take practical action.

Action Research Opportunity (p. 59): Using the **Action Research Planning Form** (pp. 35-36), research the problem, What should I do about providing opportunities for students to take different kinds of action? Design a series of lessons around a practical problem in which you provide opportunities for students to take technical, communicative, and emancipatory action. Teach the lessons and evaluate their effectiveness. Analyze your data and make recommendations for planning further lessons.

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• Review the list of process skills identified in *Videotape 1: Teaching Process Skills.* • Identify process skills students are practicing in this videotape as they study conflict resolution.
• Discuss how learning activities designed to foster practical action also provide opportunities to practice important process skills. One way to help students deepen their understanding of these skills is to engage them in actively reflecting about how they are using them. • Read **Reflection Questions for Process Skills** (p. 62) and identify those questions or questions similar to them that are used on this videotape.

Action Research Opportunity: (p. 59) Research the question, What should I do about helping students reflect on the development of process skills? Choose a series of lessons you are preparing to teach in which students will have opportunities to practice process skills such as problem solving, management, leadership, or relating to others in the context of practical problems. Use **Reflection Questions for Process Skills** (p. 62) and select questions you will ask to enhance their reflection. Use the questions to guide large group or small group discussion or individual reflection. Collect data on how students respond to these questions and what you accomplish by using them. Make recommendations for your continued efforts to help students reflect on the development of process skills.

Identify types of assessment that would be appropriate for the series of lessons on conflict management shown on the videotape, including the following.

- *Paper and pencil test*
- *Performance checklist*
- *Rubric to assess an authentic performance*
- *Portfolio*

• Choose one of the learning activities or group of activities from the videotape and practice writing an assessment for that activity or group of activities. For example, you may write a rubric for assessing the students' community service project to provide a puppet show on conflict resolution for elementary students. Possible criteria for the rubric might be quality of information on conflict resolution, communication and presentation skills, appropriateness of activity for audience, and evidence of reflection about what was learned.
• List possible evidence students could provide to illustrate their level of performance with regard to these criteria. • Share your sample assessment with colleagues and provide feedback about each others' work.

Providing opportunities for technical, communicative, and emancipatory action often leads to the design and implementation of service learning projects. • Identify the service learning projects students completed in this videotape and also in *Videotape 2: Teaching Through Practical Problems.* • Discuss what students learn from doing these projects and the ways in which service learning enhances students' knowledge and skills, particularly process skills. • Identify ways in which students were involved in planning the service learning projects to answer the question, What actions can we take to promote better conflict resolution in Videotape 3 (or in Videotape 2, What actions can we take to promote better nutrition among athletes?)?

Action Research Opportunity (p. 59): Using the **Action Research Planning Form** (pp. 35-36), research the problem, What should do about providing service learning opportunities to encourage emancipatory action? Select a problem-based unit you will be teaching and identify opportunities to invite students to plan service learning projects. If students are working as a class or within small groups, these projects could be part of the activities of a student organization. If students are working individually, these projects could become extended learning projects. Collect data on the effectiveness of your plans. After teaching the unit, analyze your actions and make recommendations for further plans to engage students in service learning and emancipatory action.

Teaching for Practical Action - Exit Reflections

- What are the most significant things you have learned about teaching for practical action?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching for practical action?
- What more would you like to learn about teaching for practical action?

Facilitator Note: To encourage reflection on what teachers are learning from these activities, ask them to complete exit reflection cards at the end of each meeting. Distribute **Teaching for Practical Action - Exit Reflections** (p. 63) or index cards and ask each teacher to respond to questions such as those above. Collect the cards as teachers leave the meeting and analyze the responses to evaluate the effect of reflection activities and to plan further meetings.

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HANDOUTS

Handout and overhead masters are provided for the convenience of the facilitator and participants. All handouts and overhead masters (OM) are referenced for each videotape in the Reflection and Inquiry Activities sections of this *Guide*.

Permission is granted for handouts and overhead masters to be copied for teachers participating in professional development activities related to this videotape series. **Background Information on Problem-Based Teaching** (pp. 4-6) and **Before Viewing the Videotape Series...**(p.8) may also be used and copied as handouts. The handouts may be modified based on the needs of the teachers.

As you view *Videotape 1: Teaching Process Skills*

1. What do students and teachers see as the benefits of the problem-based approach? What do students gain? What do teachers gain?

2. What are the four process skills identified on this tape? Why are they important?

3. What sequence of activities does the teacher use to introduce students to problem solving? Why has she selected these activities?

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Essential Components of Problem-Based Teaching

Problem-based teaching engages students in actively solving real-life, practical problems. This approach includes three essential components:

Teaching Process Skills

Essential process skills prepare students to reason through and take action on practical problems in families, communities and workplaces. These skills are directly taught in a series of lessons, then reinforced throughout classroom learning experiences in which students practice and reflect on their skill development. Essential process skills emphasized in the problem-based approach are:

- **Practical Problem Solving**
- **Relating to Others**
- **Leadership**
- **Management**

Teaching Through Practical Problems

In problem-based teaching, the content of the curriculum is organized around practical problems. Learning experiences are designed to engage students in solving practical problems by:

- **Posing and analyzing practical problems**
- **Seeking information for reasoning**
- **Deciding on and taking a course of action**
- **Reflecting on the action taken**

Teaching for Practical Action

In problem-based teaching, learning experiences are designed to help students take practical action to solve practical problems in three ways:

- **Technical Action**: Using "how to" knowledge
- **Communicative Action:** Seeking an understanding of others' perspectives
- **Emancipatory Action:** Evaluating conditions, making reasoned decisions, and taking action that is best for self and others

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What are Process Skills?

Process skills are complex thinking and interpersonal processes required to take action that is best for self and others in families, workplaces, and communities. In education today, researchers, theorists, and curriculum developers conceptualize these skills in many different ways. Process skills are often associated with lifelong learning, self-responsibility, character development, and workplace success.

Four process skills are emphasized in the problem-based teaching approach described in this videotape series. These four skills do not represent a hierarchy or even a comprehensive list of process skills. They are, however, the critical tools essential to resolving and taking action on practical problems in families, workplaces, and communities.

Process Skill	Significance	Key Components
Problem Solving	All students face complex, everyday practical problems. The choices students make with regard to these problems shape their lives and the lives of others.	• Identifying problems • Seeking adequate and reliable information • Evaluating choices and potential consequences using values, goals, and contextual factors as criteria • Drawing conclusions and selecting ethical actions • Reflecting on the decision and evaluating actions taken
Relating to Others	The way in which students relate to others influences their success in building strong relationships. Caring, respectful relationships are needed to build strong families, create productive workplaces, and construct supportive communities.	• Building caring, respectful relationships • Communicating effectively • Resolving conflict constructively
Leadership	Leaders are needed in families, workplaces, and communities. Shared leadership is needed to empower people to shape their own lives and the lives of others.	• Working with others to establish group goals • Empathizing and considering the perspectives of other group members • Cooperating with others to achieve goals • Using multiple leadership strategies appropriately in varying circumstances
Management	All students have access to a variety of personal, economic, material, and environmental resources. The way in which students manage resources affects their ability to take action with regard to to practical problems.	• Setting goals • Creating action plans • Organizing resources • Implementing and evaluating actions taken

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Introducing Process Skills to Students

Process skills are complex thinking and interpersonal processes that develop over time. Unlike declarative knowledge such as information, concepts, and generalizations, process skills cannot be successfully taught within a specific series of lessons. Instead, process skills must be conceptualized and nurtured over time through rich learning experiences and frequent feedback.

Introducing process skills through early learning experiences is important in order to set the stage for ongoing process skill development. A series of lessons early in a course can help you and your students reach a common understanding of what process skills are, what experience the students have already had with process skills, and ways in which they can improve and refine their use of these skills.

Introductory lessons are designed to help students...

develop a rationale for learning process skills.
Since process skills are complex and develop slowly over time, students need to understand the importance of learning them and persistently attending to their development over time.
Help students develop answers to the questions

- *Why do I need to learn these skills?*
- *How have I used these skills in the past?*
- *When will I need these skills in the future?*
- *How can I tell if I am improving my skills over time?*

understand process skills. Through examples, demonstration, modeling, practice with guided feedback, and process skill assessment rubrics, you can help students answer the questions

- *What are process skills?*
- *When should I use each process skill?*
- *What are the distinguishing characteristics of each process skill?*
- *How will I know when I am performing each process skill well?*

establish a vocabulary that can be used to practice and reflect on the development of these skills. By identifying and defining terms associated with each process skill, you can help students answer the questions

- *What words can I use to describe my use of process skills?*
- *How should I reflect on using the process skills?*

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Problem-Solving Lessons

Student Learning Objectives:

1. Recognize practical problems and the importance of learning how to solve them.
2. Identify the consequences of using various ways to solve problems.
3. Identify the components of the REASON model for solving problems and key questions to ask at each step.

The following activities are organized for approximately 50-minute class periods.

Day 1

Learning Activities	Questions
The teacher introduces the unit topic and asks students to draw a card describing a sample problem, read the problem, and stand in the area of the room that best describes a category to which his or her problem would belong.	• What kinds of problems will you encounter in your life? • Who has these problems? • How often do people face these problems? • Who is responsible for solving these problems? • What skills do you need to solve these problems?
The teacher and students discuss what these problems have in common and conclude that they are all examples of practical problems.	• What do these problems have in common? • Why are these problems important? • What makes these problems difficult to solve? • How are these problems different from scientific problems? • Why is it important for you to learn how to solve problems? • Who will be affected by these problems? • What would be things we would have to consider as we solve these problems?
The teacher and students discuss different ways to solve problems, such as • Impulse • Imitation • Habit or tradition • Default • Reasoning	• What are the consequences of solving problems in these ways? • What problem solving methods have you used? • Which of these problem solving methods is best for practical problems? Why?

Day 2

Learning Activities	Questions
The teacher demonstrates the REASON model for solving practical problems.	• Why is each step of the REASON model important? • What are the advantages of using REASON? • The disadvantages?
Students are given a problem to solve in small groups. Students use the Practical Problem-Solving Think Sheet to guide their reasoning.	
The teacher provides students with feedback about their problem-solving and explains that students will have continued opportunities to practice practical problem solving throughout the rest of the course.	• Would your solution bring about good results? • Would your solution get you to your desired ends? • Would your solution be best for all involved?

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Considering Problem Solving...

- What rationale have students developed for learning how to solve problems?
- What have students learned about problem solving from this lesson?
- What common vocabulary have students developed around the process skill of problem solving?
- What problem solving questions have students begun to use?

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Action Research is Problem-Based Learning for Teachers!

Reflect about teaching and learning. Design ways to resolve problems or address questions you have about your practice.

Maximize your results with group think/act/share!

Four Basic Steps:

Plan. Identify a specific issue or idea about your practice and define a researchable problem.

Act. Collect background information and develop a coordinated plan of action to implement an idea or resolve an issue.

Observe. Collect data to determine the effects of your actions. Data might include your own notes of the effectiveness of actions taken; student reactions, work, or assessment scores; or videotaped or audiotaped lessons or the comments of observers.

Reflect. Review and share actions taken and observations about the effectiveness of those actions. This reflection frequently leads to further planning as the action research process begins again at a new level of awareness.

Enjoy the Journey!

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1. Plan: Identify an issue, area of interest, or idea. "What should I/we do about...?"

Describe the problem you would like to study.

What are the differences between the current situation and the desired situation?

List the specific questions you would like to address in your research. If necessary, prioritize the questions.

2. Act: Collect information and design a plan or procedure to resolve the problem or answer the research question.

What information do you need to gather before planning a course of action?

What sources of information will you use? (e.g. journal articles, books, curriculum materials, inservice/coursework, collaboration with other colleagues)

What steps will you take to solve the problem/answer the research questions?

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3. Observe: Collect data to determine the effects of your actions.

What data collection strategies will you use? Why are these appropriate methods? (e.g. notes/journal, videotape or audiotape, interviews with students, collection of student work or assessments, observation by colleagues)

4. Reflect: Make recommendations based on the results of the project

- *What are your findings*
- *What recommendations can you make based on these findings?*
- *What do these findings mean for future practice?*
- *What new problems/ideas do you have for further research?*

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Action Research Opportunities

Videotape 1: Teaching Process Skills

Action research is a process teachers can use to improve their teaching practice. It invites teachers to reflect about teaching and learning and design ways to resolve problems or address questions they have about their practice. Essentially, action research is problem-based learning for teachers. When used by groups of teachers, action research can foster collaboration and a shared commitment to improvement.

Action Research Opportunity:
Research the practical problem, What should I do to introduce my students to practical problem solving?

Using the **Action Research Planning Form** plan a series of lessons to introduce practical problem solving in your classroom. *The Work and Family Life Resource Guides* listed in the Suggested Resources section of this guide can provide sample activities for these lessons. Try your plans out in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

Action Research Opportunity:
Using the **Action Research Planning Form** research the question, What should I do to help students thinkthrough practical problems? Review the **Practical Problem-Solving Think Sheet** that the teacher on the videotape uses to introduce students to the steps of the practical problem-solving process. Design a think sheet for your students to use when they are reasoning through practical problems in your classroom. Use the think sheet with your students and ask for their feedback. Reflect on the think sheet and modify it for future use based on your findings.

Action Research Opportunity:
Using the **Action Research Planning Form** research the question, What should I do about introducing my students to important process skills? Plan lessons to introduce other process skills, such as management, leadership, and relating to others. *The Work and Family Life Resource Guides* listed in the Suggested Resources of this guide can provide sample activities for these lessons. Try your plans out in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

Action Research Opportunity:
Using the **Action Research Planning Form**, research the question, What should I do to document the development of students' process skills? Develop an assessment tool for this purpose, such as a rubric or checklist. Create a portfolio assessment plan to help students collect work and show their development of process skills over time, such as a problem solving portfolio or a communication skills portfolio or a leadership portfolio. Try out the assessment and portfolio plan in your classroom and reflect on the effectiveness of your actions.

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Different Problems — Different Approaches

A problem is a situation in which something must be solved or worked out by selecting from many possible solutions. There are different kinds of problems and each type requires a different problem solving process.

Scientific or Technical Problems

Scientific or technical problems require explaining something, finding information, or applying a procedure. Your students have probably studied a process for scientific inquiry that includes:

- defining a problem
- collecting information
- forming a hypothesis
- experimenting to test the hypothesis
- observing and recording data
- drawing conclusions

Theoretical Problems

Theoretical problems are questions that don't really require taking action, but instead require explaining where you stand on a particular issue. To organize information and take a position, as is often done in a formal debate, students might use a process that includes:

- defining the problem
- gathering information
- setting up opposing arguments and information to support or refute each argument
- deciding which argument has the strongest support

Practical Problems

Practical problems are everyday problems that involve taking some kind of action. When practical problems reoccur over generations, they are considered to be perennial problems. Some examples of practical, perennial problems are:

- What should we do about nurturing human development?
- What should we do about relating to others?
- What should we do about using resources to meet family needs and goals?

These problems – usually phrased with the question, "What should I do about..."– have several characteristics that distinguish them from scientific or technical or theoretical problems.

Practical problems:

- involve taking action that will affect the well-being of others. Consequently, practical problems are also referred to as *ethical* issues. Making an ethical choice means deciding what is fair, right, or in the best interests of all persons involved.
- involve conflicting values. Since practical problems have a significant impact on others, the values, feelings, and needs of all involved in the situation should be considered when problem solving.
- are different based on the context or situation in which the problem occurs. Each practical problem has its own set of circumstances that must be considered when deciding what is best to do.
- frequently have no one right solution, but instead have a number of solutions that could be right for specific people and specific circumstances.
- require deciding on a course of action, even if that action is to do nothing about the practical problem. Usually practical problems involve selecting from a wide variety of alternative choices.
- are ill-structured, complicated, and messy to solve because they involve reasoning with knowledge that is incomplete or predicting consequences that cannot be fully determined.

Practical problem solving is needed to solve complex practical problems. This process, outlined on **REASON Model for Problem Solving**, includes:.

- Using ethical reasoning, which involves considering the consequences of actions on self and others
- Seeking and organizing both factual and value information for reasoning
- Identifying criteria and standards and using them to weigh alternatives

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Thinking About Different Problems, Different Approaches

- What makes practical problems different from scientific or technical problems?

- Why is it important for students to learn how to solve practical problems?

- What specific questions are important for students to consider as they solve practical problems?

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REASON Through Practical Problems

In order to reason through practical problems and find the best solution for self and others, it is important to consider many things about the problem, the situation, the possible solutions, and the consequences of each choice. The **REASON** model can be a guide for thinking through complex practical problems. The components do not need to be used in the order given, but each component is important to the reasoning process.

R ecognize the Problem:	Practical problems can be very complex, and sometimes just identifying the problem itself can be a real challenge. Each practical problem has a unique context, and the context of the problem can influence the solution. At this point, it is important to consider what one really wants to happen when the problem is resolved. In other words, determine the desired ends.	*What is the problem?* *Why is it important to address the problem?* *What is the context of the problem?* *What caused the problem?* *Who is involved?* *What factors about this problem will affect the decision about what to do?* • *What resources are available?* • *What situational factors affect the situation?* *What goals do you have for the solutions to the problem?* *What are the desired ends you want to achieve?*
E valuate Information Needed to Solve the Problem:	Solving practical problems requires both factual and value information. Factual information includes the concepts and knowledge that will help in developing and evaluating choices. Value information includes personal values, the values of others involved, and values that will help you in making an ethical choice.	*What factual information is needed?* *Where can you obtain this factual information?* *What are your personal values regarding this problem situation? Which of these values are most important?* *What are the values of others involved in this situation?* *How will those values influence your decision about what to do?*
A nalyze Choices and Consequences:	There are always more than one choice involved in a practical problem. Sometimes there may be many choices. Even doing nothing about a problem is a choice. Each choice carries with it possible consequences, consequences for self and others, as well as both short-term and long-term consequences.	*What choices are possible?* *What are the short-term and long-term consequences of each choice?* *What are the consequences for you and for others?*
S elect the best choice:	Making a decision about which alternative is best means evaluating each alternative against the value information and desired ends.	*Which choice best reflects the values you have and the ends you desire regarding this problem?* *Which choice would result in the most positive consequences for you and for others?* *Which choice works best for this particular situation?*
O utline and Implement a Plan for Action	Problems are not solved until a reasoned decision is put into action. Action requires careful planning.	*What skills do you need to carry out this choice?* *What resources do you need to carry out this choice?* *What barriers exist that might prevent you from taking action?* *How can you overcome these barriers?* *How can you organize the various tasks needed to achieve this solution?*
N ote the Results of your Action(s)	Evaluating the outcome of a choice will help determine if it was the best solution and identify what was learned from solving the problem.	*Would you make the same choice again? Why or why not?* *What have you learned?* *How will this problem-solving experience affect your problem solving in the future?* *Did your actions enhance the well-being of self and others?* *Were your actions ethical?*

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Practical Problem-Solving Think Sheet (page 1 of 2)

One way to make sure you are reasoning carefully through a problem is to record your thoughts about the practical problem and possible solutions.
Use this worksheet to implement the REASON model for solving practical problems.

R ecognize the Problem

State the problem to be solved. "What should I/we do about...?"

List factors about the context of the problem that will influence the solution.

Identify desired ends for this problem.

E valuate Information Needed to Solve the Problem

List factual information you will need to solve this problem.

List value information you will need to solve this problem.

Identify the criteria that you will use to decide the best way to solve this problem.

A nalyze Choices and Consequences

Choices:	Consequences for self:		Consequences for Others:	
	(+)	(-)	(+)	(-)

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Practical Problem-Solving Think Sheet (page 2 of 2)

elect the Best Choice

How does this meet the criteria you set in terms of:

- Values?
- Desired Ends?
- Positive consequences for self and others?

utline and Implement a Plan for Action

Action Steps:	Begin (date)	Complete (date)
1.		
2.		
3.		
4.		

ote the Results of Your Action(s)

State reasons why your choice was or was not best for self and others

What have you learned from solving this problem?

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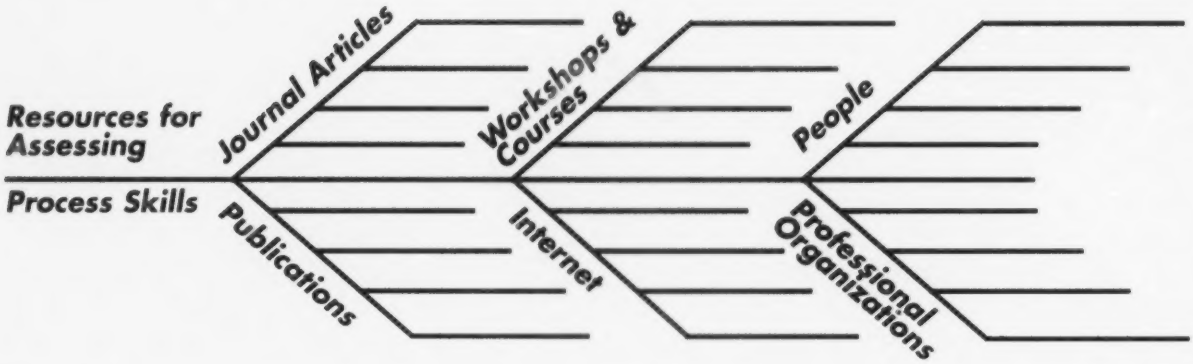
Fishbone Graphic Organizer



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Teaching Process Skills - Exit Reflections

- What are the most significant things you have learned about teaching process skills?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching process skills?
- What more would you like to learn about teaching process skills?

Teaching Process Skills - Exit Reflections

- What are the most significant things you have learned about teaching process skills?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching process skills?
- What more would you like to learn about teaching process skills?

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As you view *Videotape 2: Teaching Through Practical Problems*

1. What sequence of activities are followed in the sample lesson?

2. What does the teacher do to facilitate the students' problem solving?

3. What type of questions does the teacher ask students?

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Identifying Practical Problems for Instruction

Though problems are often viewed in a negative way, problem-based teaching focuses on problems as opportunities to learn. When you pose a practical problem for students to solve, you are inviting their natural curiosity to learn about the world around them and apply that information in meaningful ways in their own lives.

The problems that can frame instruction in problem-based learning can be chosen by you or by your students. When you choose a problem, you will consider what type of problem best incorporates the content and processes you believe are important learning objectives for your students. Other problems may emerge from the real-life issues students face, as you help students realize and make the connection between the subject matter you teach and those issues.

Several criteria can be used as you select problems for instruction. These problems should be:

Complex and have many possible solutions

To stretch students' ability to use in-depth content as well as their creative abilities, complex problems are needed. When many solutions are possible, students will gain important experience in justifying their choice.

Relevant and engaging to students

If students do not see the problem as relevant and important to solve, they will not be motivated to persist through the challenges of seeking and organizing information, creating and analyzing alternatives, and preparing a justification for their choice. Your students will no doubt let you know when they are *not* engaged by a problem!

Connected to the real world

The problems selected should place students in real-life roles. If possible, the solution to the problem should be presented to a real-life audience or result in a service learning project that transfers knowledge beyond the classroom.

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Practical problems

- Are complex, ill-structured, messy
- Have many possible solutions
- Involve ethical decisions
- Relevant and engaging to students
- Are connected to the real world
- Require choosing a course of action

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Problem-Based Teaching Model

1. Pose and analyze a practical problem.

a. Define the problem and analyze its significance.

- *Why is it important to learn more about this problem?*
- *Who should we consider when solving this problem?*
- *What information do we need to know in order to solve this problem?*
- *What might be some of the choices we would consider? The consequences of those choices?*

b. Relate the problem to students' prior experience and present knowledge

2. Seek and organize relevant information for problem solving.

a. Seek information.

- *What information will students need?*
- *Where will it be found?*
- *How will they know when it is adequate?*
- *How will they know it is reliable?*
- *How much time will be needed to gather information?*

b. Generate alternatives, predict consequences.
c. Generate criteria for evaluating alternatives.

3. Decide on and take a course of action.

a. Present and justify solutions.
b. Develop plans for taking action.
c. Carry out actions in the classroom or community.

4. Reflect on the action taken.

- *In what ways were the consequences of the action taken as expected? Not as expected?*
- *Were our actions ethical?*
- *If doing it over, what would you change?*
- *What did you learn about the problem-solving process?*

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Practical Problem: What should I eat to improve the performance of my high school athletic team?

Student Learning Objectives: The following activities are organized for approximately 50-minute class periods.

Day 1

Learning Activities	Questions
The teacher distributes the practical problem and it is read aloud to the class. The teacher and students discuss the nature and significance of the practical problem and the teacher outlines the guidelines for the unit project, a presentation of information about sports nutrition and recommendations about the athlete's food choices.	• What makes this a practical problem? • Why should we be concerned about this? As individuals? As team members? As the coach?
Students brainstorm things they know or believe to be true about sports nutrition. In small groups, students decide on topics from the brainstormed list that they will research.	• What do you know about sports nutrition? • What information do you believe to be true? • What experience have you have with this practical problem? • What happens when people believe things about sports nutrition that are not true? What are the consequences for self? Others? Community? • How does society perpetuate myths about sports nutrition?

Day 2-3

Learning Activities	
The students research information on sports nutrition, using books, magazines, computer information network.	• Is the information reliable? • Do we have adequate information about the topic? • How should we organize this information for our presentation?

Day 4

Learning Activities	
Each student group presents the information found on their topic. The students and teacher assess their performance using an assessment rubric.	• Is this information adequate and reliable? • What are some of the criteria we use to solve a problem? • What are the consequences of athletes *not* using this information? • Who would be affected if this information was not used?

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Day 5

Learning Activities

Given the information about sports nutrition, the students and teacher discuss their alternatives regarding the practical problem.

Questions

- What would be the consequences of using the information we have learned about sports nutrition?
- What must be changed if athletes are to eat in ways that improve their performance?
- Who would be affected by your actions?
- How do people's health choices affect society as a whole?
- Would eating well be an ethical choice? Why or why not?
- What would happen if everyone on your team followed this advice?
- What actions could we taken to promote good sports nutrition?

As a class, students decide what further projects they could do to promote good sports nutrition. Their plans include:

- Serving a pre-game meal to a sports team at their high school
- Designing a sports nutrition brochure for athletes and their parents

These activities are planned and conducted over the course of several weeks.

Day 6

(following the completion of extended activities)

Learning Activities

Students reflect on the actions they have taken to promote good sports nutrition.

Questions

- What were the results of our actions?
- What impact did our actions have on others?
- Were our actions ethical?
- Did our actions promote good sports nutrition?
- What have we learned from this project?
- How will this problem-solving experience affect our future actions?

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Sample Sequences of Learning Activities

Traditional	Problem-Based
1. Teacher introduces topic.	1. Pose (teacher or students), define and analyze practical problem.
2. Teacher uses a variety of strategies to present information.	2. Students seek and organize relevant information, generate alternatives and criteria for evaluating.
3. Students asked to develop pre-game meal for athletes in case study.	3. Students decide on and take a course of action
4. Teacher assigns group of students to prepare in lab. Students sample and evaluate foods prepared.	4. Students reflect on the action taken and results.
5. Students take paper and pencil test.	

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Action Research Opportunities

Videotape 2: Teaching Through Practical Problems

Action Research is a process teachers can use to improve their teaching practice. It invites teachers to reflect about teaching and learning and design ways to resolve problems or address questions they have about their practice. Essentially, action research is problem-based learning for teachers. When used by groups of teachers, action research can foster collaboration and a shared commitment to improvement.

Action Research Opportunity:
Using the **Action Research Planning Form**, research the issue, What should I do to implement teaching through a practical problem? Plan a series of lessons using the **Problem-Based Teaching Model**. Try out your plans in the classroom and collect data on the effectiveness of the lessons. Reflect on the effectiveness of your lessons and develop recommendations for teaching these lessons in the future.

Action Research Opportunity:
Use the **Action Research Planning Form** to research the issue, What questions can I ask students to facilitate problem solving? Select a problem-based unit you will be teaching and create a list of questions for that unit. Tape record or videotape the unit and analyze how students respond to the questions you ask.

Action Research Opportunity:
Research the issue, How should I assess my students during a problem-based teaching unit? Select a problem-based teaching unit you have developed and create a plan for assessing your students during that unit. Try to include a variety of assessments, including alternative assessments such as rubrics to document process skills or authentic performance. Use your assessment tools and collect data about their effectiveness. After reflecting on the effectiveness of your tools, make recommendations for future assessment practices.

Action Research Opportunity:
Developing problems for students to solve lends itself well to integrating different subject matter areas. Through problem-based teaching, students can see how different subject matter areas connect. Research the issue, What should we do to integrate instruction in a way that is meaningful for students? Working with several teachers from different subject matter areas, plan and teach a thematic unit based around a practical problem. Begin by selecting a unit in which students must learn substantive content from a variety of subject matter areas. Decide how you will introduce students to the problem and how you will frame the problem-solving task. Teach the unit, collect data about it's effectiveness, and reflect on your actions by making recommendations for teaching integrated units in the future.

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How did questions...

1. make connections between new information and prior knowledge?

2. organize and facilitate the learning environment to promote problem solving?

3. reason through a practical problem?

4. decide whether or not a solution is ethical?

5. take action that will help others as well as staff?

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Presentation Assessment Rubric

Criteria	Secure	Developing	Beginning
Informative	• Used a variety of sources • Important, relevant information identified • Well-organized • Thorough; sequence of information effective	• Used a few sources • Covers most information • Organized • Adequately sequenced	• Used one or two of sources • Information lacks depth or does not address topic • Somewhat unorganized
Accurate	• Evaluated reliability of all sources • Identified values, credentials, and intent of authors for various sources	• Evaluated reliability of a few sources	• Evaluated reliability of main source
Interesting	• Used good voice tone • Made good eye contact • Used a variety of media during presentation to hold audience interest	• Used good voice tone • Avoided reading presentation; made good eye contact	• Used good voice tone
Creative	• Used media to add interest and emphasis • Used examples or case studies to creatively present information • Used additional strategies to involve audience	• Used media to add interest and emphasis • Used examples or case studies to creatively present information	• Used media to add interest and emphasis

Reflection Questions

Please respond to these questions on a separate sheet of paper.

1. What did you learn about your ability to communicate ideas and information in a formal presentation?
2. Describe your strengths in presenting ideas and information.
3. What would you do differently if you had to do this over again?
4. How might the ability to communicate ideas and information be helpful in personal, work, school, and family life?

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Teaching Through Practical Problems - Exit Reflections

- What are the most significant things you have learned about teaching through practical problems?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching through practical problems?
- What more would you like to learn about teaching through practical problems?

Teaching Through Practical Problems - Exit Reflections

- What are the most significant things you have learned about teaching through practical problems?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching through practical problems?
- What more would you like to learn about teaching through practical problems?

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As you view *Videotape 3: Teaching for Practical Action*

1. What learning activities are used to encourage different kinds of action?

2. What kinds of questions does the teacher ask during the lessons?

3. How are process skills reinforced through this unit on conflict resolution?

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Three Systems of Action

In order to resolve practical problems, students must be able to take different kinds of action. In problem-based teaching, learning experiences are designed to help students take practical action in three ways:

Technical Action	Communicative Action	Emancipatory Action
Involves use of "how to" knowledge Is undertaken to control or shape environment Uses knowledge without question from an expert source	Involves sharing beliefs, meanings, understandings Is used to develop public or personal shared meanings Is based on the human need to understand self and others	Involves consideration of ethical implications of actions–consequences for self, others, and society Involves evaluating social conditions, underlying norms, and values to identify what should be changed or upheld in the best interests of self and others Is based on the human need of autonomy, freedom, and justice

Since all three types of action are important in resolving practical problems, using just one of the three may result in an insufficient response. Technical action, for example, involves using prescriptive knowledge and skill, which may not be appropriate unless underlying assumptions and beliefs are understood. Communicative action, while important to understanding the beliefs and meanings of others, can be distorted. Emancipatory action is needed because it involves critical reflection—scrutinizing conditions and underlying assumptions to arrive at actions that support needed change.

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Questions for Practical Action

Technical Questions

Who? What? When? Where?

What is happening here?

What causes this?

What is the real problem?

What is our concern?

What is our goal?

What information do we need to decide what to do?

Is this reliable information?

Do we have all the information we need?

What are our alternatives?

What steps do we need to take to accomplish our goals?

What facts support our decision?

What procedure should be followed?

How does this work?

Communicative Questions

What is important to you?

What does this mean to you?

What do you believe?

Where could such a belief originate?

What social forces brought that belief about?

What personal factors will affect your decision? Goals? Values? Beliefs? Resources?

What environmental factors will affect your decision?

What are the perspectives of others?

What meanings or intentions are reflected in the particular actions of others?

What values, goals, and beliefs do others or those affected have?

What criteria should be used to decide what to do?

What new meanings or insights have you become aware of as a result of this discussion?

What consequences might these recommendations lead to?

What were your reactions about what you saw?

What goals did the other person have in mind?

What were they trying to make happen?

How did these goals work for the person involved?

What cues suggested that to you?

Emancipatory Questions

What effect will that have on the well-being of those affected?

What are you assuming or taking for granted?

Whose interests are served?

Can that practice be changed? Why or why not?

Do your beliefs about...conflict with your beliefs about...?

Does your belief about things as they are with regard to...conflict with the possibility of changing ...(social and political conditions)?

What would be the short-term and long-term consequences of that choice for you? Your family? Your community?

What would happen if we chose this action?

Is this action ethical? Why or why not?

What if everyone took this action?

Would you choose this action for yourself if you were the one being affected?

What if family/significant others knew about your decision?

What values support your decision?

Is your information relevant? Reliable? Reasonably adequate? Comprehensive?

Will acting on these values have positive long-term consequences?

Considering our criteria, what alternative actions can we create?

Are you considering what is best for all concerned?

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Action Research Opportunities

Videotape 3: Teaching for Practical Action

Action Research is a process teachers can use to improve their teaching practice. It invites teachers to reflect about teaching and learning and design ways to resolve problems or address questions they have about their practice. Essentially, action research is problem-based learning for teachers. When used by groups of teachers, action research can foster collaboration and a shared commitment to improvement.

Action Research Opportunity:
Using the **Action Research Planning Form**, research the issue, How should I question students to encourage practical action? Using a list of key questions you developed in the previous activity, begin asking these questions of your students on a regular basis. Videotape or audiotape a classroom discussion in which you use these questions. Reflect on which questions are easiest to use and which questions are most difficult to use, as well as the impact the questions seem to have on students. Analyze your students' response to the questions and make recommendations about your questioning practices in the future.

Action Research Opportunity:
Research the question, What should I do about helping students reflect on the development of process skills? Choose a series of lessons you are preparing to teach in which students will have opportunities to practice process skills such as problem solving, management, leadership, or relating to others in the context of practical problems. Use **Reflection Questions for Process Skills** and select questions you will ask to enhance their reflection. Use the questions to guide large group or small group discussion or individual reflection. Collect data on how students respond to these questions and what you accomplish by using them. Make recommendations for your continued efforts to help students reflect on the development of process skills.

Action Research Opportunity:
Using the **Action Research Planning Form**, research the problem, What should I do about providing opportunities for students to take different kinds of action? Design a series of lessons around a practical problem in which you provide opportunities for students to take technical, communicative, and emancipatory action. Teach the lessons and evaluate their effectiveness. Analyze your data and make recommendations for planning further lessons.

Action Research Opportunity:
Using the **Action Research Planning Form**, research the problem, What should do about providing service learning opportunities to encourage emancipatory action? Select a problem-based unit you will be teaching and identify opportunities to invite students to plan service learning projects. If students are working as a class or within small groups, these projects could be part of the activities of a student organization. If students are working individually, these projects could become extended learning projects. Collect data on the effectiveness of your plans. After teaching the unit, analyze your actions and make recommendations for further plans to engage students in service learning and emancipatory action.

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Practical Problem: What should we do about resolving conflict?

Objectives:

1. Explain the importance of learning how to resolve conflict.
2. Identify types of conflict.
3. Analyze sources of conflict.
4. Evaluate alternative ways to deal with conflict by predicting the positive and negative consequences of using each alternative.
5. Use listening skills to understand the perspectives of others when resolving conflict.
6. Select ethical ways to resolve conflict.
7. Educate others about constructive ways to resolve conflict.

Day 1

Learning Activities

The teacher introduces the practical problem, What should we do about resolving conflict? Each student is asked to write a letter to himself or herself about a recent conflict they have experienced and how they dealt with the conflict.

The teacher and students discuss types of conflict and sources of conflict.

Questions

- What makes this a practical problem?
- Why should we be concerned about this? As individuals? As team members? As the coach?
- Why is it so important to talk about conflict?

*Please note that the learning activities for the first day of this unit are not shown on the videotape.

Day 2

Learning Activities

In small groups, students make charts identifying ways to deal with conflict and the positive and negative consequences of using each. Small groups share their charts with the class.

Questions

- Why is it important to know the different types of conflict management?
- Why is this knowledge important?
- What would be the effects of using each of these over time?

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Day 3

Learning Activities

In pairs, students practice listening to others' conflict experiences. The students and teacher discuss the role that good listening plays in resolving conflict.

Several students from the pairs share the conflict examples they discussed.

In small groups, students identify service learning projects they could do to promote better conflict resolution in their community. Students select and plan their projects, including:

- A puppet show for elementary students
- A survey of conflict management strategies given to all homeroom class. Skits performed for the school on Channel 1
- PA Announcements about good conflict management

Questions

- How did it feel to be listened to?
- How did it feel to be the listener?
- Why is it important to use listening skills when managing conflict?
- What were the consequences of that conflict for self and others?
- Do you think the actions were ethical?
- How could this have been resolved in a more positive way?
- Would you do the same thing five or ten years from now?
- What actions could we take as a class to help others in our school, our community, or even our world resolve conflict?

Day 4

(Following service learning activities)

Learning Activities

Students reflect on the actions taken to improve conflict management skills in the community.

Questions

What were some positive results of our actions?
How will our actions affect the community?

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Reflection Questions for Process Skills

Incorporate reflection time following classroom activities in which students practice process skills. The questions below may be used for large group, small group, and pair discussion, as well as for written reflection in journals, on paper and pencil tests, or other assessments.

Problem Solving

- How did you go about solving the problem?
- Did you use reasoning to solve the problem? Why or why not?
- What specific reasoning skills did you use?
- Was the solution you chose in the best interests of those involved?
- What values supported your decision?
- Was the solution you chose ethical? Why or why not?
- When presented with a similar problem in the future, what would you do differently? The same?
- What have you learned about problem solving from this experience that you will use in the future?

Relating to Others

- What communication skills did you use in this experience?
- Give examples of ways in which you communicated well. Give examples in which you could have improved your communication.
- How did you go about managing conflict in this situation?
- Were the ways in which you related to others in this experience in the best interests of those involved? Why or why not?
- What was most challenging about relating to others in this situation?
- What have you learned about relating to others from this experience that you will use in the future?

Leadership

- What was the goal of your group? Was the goal achieved? Why or why not?
- Identify ways in which your group cooperated well. Identify ways in which they could improve their cooperation.
- Did everyone participate in the activiteies of the group? Why or why not?
- What style(s) of leadership did you notice during your group interaction?
- Were the leadership styles used in the best interests of the group? Why or why not?
- What have you learned about leadership from this experience that you will use in the future?
- What is the difference between management and leadership? How are management and leadership related?

Management

- How did this learning activity give you an opportunity to practice management skills?
- What management skills or techniques did you use?
- What resources did you manage?
- Were the management strategies you used in the best interests of those affected by your actions? Why or why not?
- Did the management strategies you used allow you to achieve your goal? Why or why not?
- Did you manage well? Why or why not?
- In a new situation, what would you do differently? The same?
- What have your learned about management from this experience that you will use in the future?

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Teaching for Practical Action - Exit Reflections

- What are the most significant things you have learned about teaching for practical action?
- What actions do you plan to take as a result of what you have learned? Why do you feel it is important to take these actions?
- What questions do you still have about teaching for practical action?
- What more would you like to learn about teaching for practical action?

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Suggested Resources

General References on Problem-Based Learning

Brooks, J. G., & Brooks, M. G. (1993). *In search of understanding: The case for constructivist classrooms.* Alexandria, VA: Association for Supervision and Curriculum Development.

Glasgow, N. A. (1997). *New curriculum for new times: A guide to student-centered, problem-based learning.* Thousand Oaks, CA: Corwin Press, Inc.

Savery, J. R., & Duffy, T. M. (1995). Problem-based learning: An instructional model and its constructivist framework. *Educational Technology.* pp. 31-38.

References for Videotape 1: Teaching Process Skills

Costa, A. (1991). *Developing minds: A resource book for teaching thinking.* Alexandria, VA: Association for Supervision and Curriculum Development.

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Marzano, R. (1992). *A different kind of classroom: Teaching with dimensions of learning.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R., Pickering, D., & McTighe, J. (1993). *Assessing student outcomes: Performance assessment using the dimensions of learning model.* Alexandria, VA: Association for Supervision and Curriculum Development.

Secretary's Commission on Achieving Necessary Skills (1991). *What work requires of schools.* Washington, DC: U.S. Department of Labor.

Videotape 2: Teaching Through Practical Problems

Casey, M. B., & Tucker, E. C. (1994, October). Problem-centered classrooms: Creating lifelong learners. *Phi Delta Kappan.* pp. 139-143.

Checkley, K. (1997, Summer). Problem-based learning: The search for solutions to life's messy problems. *Curriculum Update.* Alexandria, VA: Association for Supervision and Curriculum Development.

Fox, Candace K. (1997, Summer). Incorporating the Practical Problem-Solving Approach in the Classroom. Alexandria, VA: *Journal of family and Consumer Sciences.* pp 37-40.

Videotape 3: Teaching for Practical Action

Baldwin, E. E. (1985). Home economics curriculum: Political-moral aspects. *Journal of Vocational Home Economics Education,* 3 (3), pp. 3-17.

Kowalczyk, D., Neels, N., Sholl, M. (1990, May/June). The critical perspective: A challenge for home economics teachers. *Illinois Teacher.* pp. 174-177, 180.

Laster, J. F., & Thomas, R. (1997). *Thinking for ethical action in families and communities.* Peoria, IL: Glencoe/McGraw-Hill.

Morgaine, C. A. (1992, January). Alternative paradigms for helping families change themselves. *Family Relations.* pp. 12-27.

Suggested Resources

Resources for Action Research

Altricher, H., Posch, P., & Somekh, B. (1993). *Teachers investigate their work.* London: Routledge.

Calhourn, E. (1993, October). *Action research: Three approaches.* Educational Leadership. pp. 62-65.

Kemmis, S., & McTaggert, R. (1988). *The action research planner.* Geelong, Victoria, Australia: Deakin University Press.

Miller, D. M., & Pine, G. J. (1990). Advancing professional inquiry for educational improvement through action research. *Journal of Staff Development.* 11 (3), pp. 56-61.

Sagor, R. (1992). *How to conduct collaborative action research.* Alexandria, VA: Association for Supervision and Curriculum Development.

Related Resources

The Vocational Instructional Materials Laboratory, Center on Education and Training for Employment, The Ohio State University, has several products that would be helpful to teachers implementing a problem-based approach.

Work and Family Life Resource Guides
These resource guides organize teaching units according to practical problems and include teacher background information, learning activities, assessment ideas, and handouts. Modules are included to help teach students the process skills of problem solving, management, leadership, and relating to others. Each of the process skills modules includes teacher background information about the skill. A resource guide is available for each of the following areas

- Personal Development
- Resource Management
- Life Planning
- Nutrition and Wellness
- Family Relations
- Parenting

Adolescent Parent Resource Guide
Designed to assist teachers serving pregnant and parenting teens, this resource provides individual and group learning activities for each of four process skills: problem solving, relating to others, management, and leadership. In addition to learning activities, teacher background information and assessment rubrics are provided for each skill.

Home Economics Middle School Resource Guide
This resource contains a comprehensive curriculum focusing on the developmental tasks of early adolescence. Modules on process skills are included for interpersonal skills, problem solving, management, and leadership.

Alternative Assessment: A Family and Consumer Sciences Teacher's Tool Kit
This resource provides suggestions for assessing the development of students process skills as well as strategies for assessing projects and other performance tasks associated with problem-based learning.

To order resources from the Vocational Instructional Materials Laboratory, request a catalog and order forms by:
Phone: 614-292-4277 or 800-848-4815, Ext. 2-4277
FAX: 614-292-1260
E-mail: VIML@osu.edu

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Problem-Based Teaching:

Bridge to Meaningful Learning

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